EXHIBIT B

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

COBBLESTONE WIRELESS, LLC, Plaintiff, v. T-MOBILE USA, INC. Defendant, NOKIA OF AMERICA CORPORATION, ERICSSON INC. Intervenors.	Case No. 2:22-cv-00477-JRG-RSP (Lead Case) **JURY TRIAL DEMANDED**
COBBLESTONE WIRELESS, LLC, Plaintiff, v. AT&T SERVICES INC.; AT&T MOBILITY LLC; AT&T CORP. Defendant, NOKIA OF AMERICA CORPORATION, ERICSSON INC. Intervenors.	Case No. 2:22-cv-00474-JRG-RSP (Member Case) **JURY TRIAL DEMANDED**
COBBLESTONE WIRELESS, LLC, Plaintiff, v. CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS. Defendant, NOKIA OF AMERICA CORPORATION, ERICSSON INC. Intervenors.	Case No. 2:22-cv-00478-JRG-RSP (Member Case) **JURY TRIAL DEMANDED**

PLAINTIFF COBBLESTONE WIRLESS, LLC'S PATENT RULE 4-3 DECLARATION

I. Introduction; Background and Qualifications

A. Retention

1. I, Todor Cooklev, declare as follows:

2. I have been retained as an expert witness by the law firm of Russ August & Kabat on behalf of Plaintiff Cobblestone Wireless, LLC ("Cobblestone") to testify as a technical expert in this case.

3. The statements made herein are based on my personal knowledge. If I were called to testify, I could and would testify competently and truthfully with regard to the statements contained in this declaration.

4. There are occasions where new facts or information come to light that are relevant to my opinions. For example, new information may come to light through discovery, such as new information being produced by the Defendants, Intervenors, or other third parties. I reserve the right to supplement my opinions to address any new discovery, information, or events which may transpire after the date of this declaration, such as information that comes to light from declarations submitted by the Defendants and Intervenors in this matter. For simplicity, I will subsequently refer to Defendants and Intervenors simply as Defendants.

5. For my time in this matter, I am being compensated at my standard rate of $700 per hour. My compensation does not depend on the outcome of the case, the contents of this report, or any testimony I may provide. I have no personal interest in the outcome of this matter. In addition, I expect to be reimbursed for travel and other reasonable expenses incurred in the course of my work on this matter.

B. Expert Background and Qualification

6. Included below is a summary of my educational background, career history, publications, and other relevant qualifications. In addition, I am attaching my Curriculum Vitae,

which includes additional information about my qualifications and publications, to this Declaration.

7. I am currently Professor of Electrical and Computer Engineering at Purdue University in Fort Wayne, Indiana, where I have had several faculty and administrative appointments. I teach several courses related to the hardware and software architectures of wireless systems and wireless devices. I have given and continue to give seminars, tutorials, and presentations worldwide.

8. I received a Diploma of Engineering in the field of Electrical Engineering from the Technical University of Sofia, Bulgaria in 1988. I received a Doctor of Philosophy (Ph.D.) degree in Electrical Engineering from Tokyo Institute of Technology in Tokyo, Japan in 1995.

9. I have authored and co-authored more than 100 peer-reviewed articles. I am a named inventor on 32 U.S. patents, most of which relate to the hardware or software aspects of communication systems. For part of this work, in 1999, I was inducted into the Purdue Inventors Hall of Fame.

10. At present I am the Series Editor for Wireless and Radio Communications for the IEEE Communications Standards Magazine (which is the premier journal in the field of communication standards) and have held that position since 2017.

11. I also have experience in technology and product development in the computer networking and data communications industry. My work has been in digital signal processing, software, and integrated circuit design for communication systems.

12. I have contributed to the development of several major standards for communication systems. I have participated in many meetings of standards committees. I have prepared, submitted, and presented documents relating to technical matters considered by these committees.

I have also drafted liaison letters among different standards committees. Liaison letters are a means by which working groups communicate with other technical bodies. I have chaired some committee meetings and served in other leadership roles.

13. During 2000-2002 and 2005-2008 I was a Voting Member of the IEEE 802.11 Working Group. For part of that time, I served as Chair of a Study Group, which later became a Task Group. For this work I received an award from the IEEE Standards Association in 2012.

14. As part of my long record of service to the IEEE Standards Association (IEEE SA), I have reviewed and voted on many IEEE standards, including most IEEE 802.11 standards and amendments since 2000.

15. Around 2006-2008 I served as Chairman of the IEEE Standards in Education Committee, a committee jointly sponsored by IEEE SA and IEEE Educational Activities Board. Around that time, I was also the Principal Investigator of a National Science Foundation grant awarded to the IEEE, which supported online educational modules on IEEE SA's website, and the work of a number of undergraduate and graduate students on hardware and software projects incorporating the IEEE standards. The grant contributed to the growth of IEEE SA's business and recognition.

16. In 2020, I was elected to serve on the Board of Governors of the IEEE Standards Association for one term beginning January 2021. The Board of Governors provides overall leadership of the IEEE Standards Association.

17. A true and accurate description of my work and academic experience and other qualifications is provided in my Curriculum Vitae, which is attached. In addition, a true and accurate description of the specific cases where I have previously consulted as an expert is shown in the attachments. I have testified at deposition and at trial in a number of these cases.

18. I have previously prepared expert reports and testified in a number of cases concerning systems for wireless communication, wireless communication protocols, and hardware and software of communication devices.

19. I am qualified by education and experience to testify as an expert with respect to subject matter in the fields of wireless communications, communication protocols, hardware and software of wireless devices, and interoperability among wireless devices.

II. Level of Ordinary Skill in the Art

20. The person of ordinary skill in the art ("POSITA") of the patented technology at the time of the invention of the asserted patents would have a bachelor's degree in electrical engineering, computer engineering, computer science, physics, or the equivalent and 2-3 years of work experience with digital wireless communication, cellular communications and networking, radio-access network architectures and/or protocols, service provisioning, signal propagation in wireless networks, or the equivalent. More education could serve as a substitute for work experience, and vice versa.

III. Legal Principles

21. In this section, I address some of the legal principles that I understand to be relevant. I am not a lawyer, but I understand that the Court determines the scope and meaning of claim terms. My understanding is that all unconstrued claim terms are to be given their plain and ordinary meaning to a person of ordinary skill in the art. I understand that claim construction is a question of law for the Court.

22. I understand that in order to determine the scope of the claims, the Court construes the claims as a person of skill in the art would interpret them, as of the time of the invention. I understand that "intrinsic evidence" referring to the claims, specification, and prosecution history is the most important evidence when construing claim terms. I understand that while the starting

point is the words of the claim, the claims must also be read in the context of the entire patent, including the specification, which is the best source for understanding technical terms in a patent claim. I am informed that the prosecution history may also provide evidence of how the applicant and the USPTO understood the scope of the claims and how terms would be understood by persons of ordinary skill in the art. I am informed that extrinsic evidence outside the patent and file history (e.g., dictionaries, expert testimony, treatises) may also be considered in construing claim terms but that such extrinsic evidence is given less weight than the intrinsic evidence.

23. I understand that a claim of a patent issued by the USPTO is presumed to be valid, and that Defendants bear a burden of proof by clear and convincing evidence that any claim of an issued patent is invalid, such as invalidity for indefiniteness. I understand that a patent claim must particularly point out and distinctly claim the subject matter that is regarded as the invention so that, among other things, a person of ordinary skill in the art knows the metes and bounds of the invention. I understand that a claim is invalid for indefiniteness when there is clear and convincing evidence that the claims, read in light of the specification and prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention. I further understand that when a claim includes a term of degree, the patent must provide some standard of measuring that degree such that the claim language provides reasonable certainty to one of skill in the art when read in context of the invention.

24. I understand that means-plus-function claims are governed under 35 U.S.C. § 112(6), which states: "An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof."

25. I understand that the failure to use the word "means" in a claim creates a rebuttable presumption that § 112, paragraph six does not apply. I understand that to rebut this presumption, Defendants must demonstrate that the claim language fails to recite sufficiently definite structure, or else, that the claim language recites function without reciting sufficient structure for performing that function. I also understand that a term that might not convey structure if viewed in isolation can nevertheless derive structure from the context of the surrounding claim language. I am informed and understand that, where § 112, paragraph six does apply, the claim limitation is a means or step for performing a specified function and will be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof that are clearly linked to the specified function. I am informed and understand that the corresponding structure, material, or acts described in the specification includes any structure or algorithm that is clearly linked to the specified function and includes the corresponding structure or algorithm minimally necessary to perform the specified function. I am informed and understand that where § 112, paragraph six does apply, a claim can be indefinite if the specification fails to disclose the corresponding structure, material, or acts clearly linked to the specified functions.

IV. Disputed Term in U.S. Patent 8,891,347 ("the '347 patent")

No.	Term	Defendant's Proposed Construction	Plaintiff's Proposed Construction
1	"the channel estimation that includes the path parameter information" Claims 1 and 8 "the channel estimation including path parameter information" Claim 15[1]	The plain and ordinary meaning of the term; "the channel estimation" referenced in the disputed limitation is the algorithm that is performed in the preceding step ("performing a channel estimation")	No construction necessary; plain and ordinary meaning.

A. "The channel estimation that includes the path parameter information"

26. I understand that Defendants contend that the term "the channel estimation" in the phrase "the channel estimation that includes the path parameter information" in claims 1 and 8 (and the similar language in claim 15) means the algorithm that is performed in the preceding step ("performing a channel estimation"). The claim context for this term in, for example, claim 1 is: "sending the channel estimation that includes the path parameter information from the receiver to the transmitter via the first propagation path." A POSITA would readily understand the meaning of this phrase, and the disputed claim term within it, from the claim context, the patent specification, and background knowledge and experience. In particular, a POSITA would readily understand that the "sending" limitation does not require sending an *algorithm*, but rather sending *the channel estimation* itself. Similarly, a POSITA would readily understand that the channel estimation to be sent is the channel estimation referred to in the previous limitation, "performing

[1] I understand that Defendants indicated in their claim construction disclosure that all three claims (claims 1, 8, and 15) contain the same "the channel estimation that includes the path parameter information," but there are slight differences between claims 1 and 8 on one hand, and claim 15 on the other hand. I have noted these differences here, but these differences do not impact the substance of my analysis.

a channel estimation based on the first signal to obtain path parameter information of the first propagation path." As discussed in more detail below, claim 8 contains similar language, and claim 15 recites "receiving [rather than sending] a channel estimation."

27. I understand that Defendants previously claimed that this claim phrase was indefinite, and that they have now withdrawn that argument. It is my understanding that they have abandoned that position, and are instead presenting the position outlined here. If that changes, I reserve the right to supplement this declaration to address any indefiniteness argument as to this term or any other new arguments. To be clear, in my opinion a POSITA would readily understand the scope of the claims, as I describe below.

28. I understand that Defendants' arguments are based on the fact that the phrase "channel estimation" appears twice in claims 1 and 8, first, in the limitation reciting "perform[ing] a channel estimation" and then in the limitation reciting "send[ing] the channel estimation." In other words, Defendants contend that "channel estimation" must refer to the exact same thing in both instances, and that any context of the surrounding claim language and the patent specification (and common sense) should be ignored. I disagree. Specifically, a POSITA would understand that "perform[ing] a channel estimation" will necessarily result in an output, which would also be referred to as "a channel estimation." Thus, a POSITA would understand that the term "the channel estimation" in the disputed limitations refers to the channel estimation that results from performing channel estimation based on the first signal.

29. This is confirmed by the surrounding claim language. For instance, claims 1 and 8 recite "perform[ing] a channel estimation based on the first signal to obtain path parameter information" and "send[ing] the channel estimation that includes the path parameter information," and claim 15 recites "receiving a channel estimation based on the first signal, the channel

estimation including path parameter information of the first propagation path." With this claim language, a POSITA would understand that "performing a channel estimation" in claims 1 and 8 is done to obtain "the channel estimation" that is sent. A POSITA would further understand from the phrase "to obtain path parameter information of the first propagation path" that the channel estimation must include path parameter information of the first propagation path.

30. A POSITA would likewise understand that the limitation "send[ing]/receiving […] the channel estimation" means sending/receiving the channel estimation that was obtained by "performing a channel estimation." The claim language additionally further confirms that "the channel estimation" in the disputed limitation is this previously-obtained estimation because the claim language states that "the channel estimation … ***includes*** the path parameter information," which as noted above is at least in part what is obtained by "perform[ing] the channel estimation." *See* '347 patent at claims 1 and 8 (emphasis added).

31. I disagree that a POSITA would interpret this phrase to require sending or receiving an *algorithm*. For instance, claims 1 and 8 requires "send[ing] the channel estimation that ***includes the path parameter information***," and claim 15 requires "receiving … the channel estimation information ***including path parameter information*** of the first propagation path." Path parameter information is information obtained through measurements and/or calculations, and is not part of an algorithm. A POSITA would thus understand that the channel estimation being sent or received is ***information,*** not an algorithm, because it includes the path parameter information.

32. A POSITA would also recognize that sending an algorithm does not make logical sense in the context of the patent. The claims recite "sending" and "receiving" the channel estimation are done ***after*** a channel estimation has already been performed based on a first signal (i.e., the algorithm has already been used to obtain the channel estimation output). In the claimed

context of wireless communication, a POSITA would recognize that sending and receiving an algorithm that has already been performed to obtain the relevant output would be inefficient, unusual, unhelpful, and expensive in terms of computational and communication capacity, relative to simply sending the obtained output.

33. Furthermore, the claim recites "sending the channel estimation that includes the path parameter information," and it does not make logical sense to say that an "algorithm" includes the path parameter information. Also, as is clear from the claims and specification, the invention requires the path parameter information to be received and used by the entity that predistorts a second signal according to the channel estimation (as required by all independent claims at issue). It does not make logical sense for this entity to receive an algorithm, as opposed to information. And it would of course be simply unnecessary to send any *algorithm* used as part of a channel estimation process when it is the channel estimation *itself*—such as the path parameter information—that is used to perform the predistortion. Rather, sending the resulting channel estimation is what would be necessary to accomplish the claimed predistortion. I note that if the claim intended for the algorithm itself to be transmitted, it could be phrased as "sending the channel estimation algorithm." It was not so phrased.

34. My understanding that the claimed phrase "the channel estimation that includes the path parameter information" refers to the channel estimation that includes the path parameter information for the first propagation path, which was obtained by performing a channel estimation on the first signal, is also supported by other portions of the intrinsic record. For example, with reference to the embodiment of Figure 4, the specification states:

> [A]t 410 … ***a channel estimation of a first signal is performed so as to obtain path parameter information of the propagation path*** 170, 175, or 180. ***During this process,*** a transmitter transmits 420 a first signal from the transmitter 110 to the receiver 150. … After the first signal is received 430 at the received 150, ***a channel***

> ***estimation algorithm is performed*** to obtain estimates of [various information] for each of the propagation paths 170, 175, and 180.

Id. at 8:4-16 (emphases added); *id.* at 8:17-67 (describing various algorithms by which the channel estimation may be performed). A POSITA would understand from this passage, as with the claims themselves, that any channel estimation algorithms are used to "perform the channel estimation" and the result provides various information for a given propagation path. The specification continues:

> Next, at 440 the receiver 150 ***feedbacks these path parameter information*** to the transmitter 110 via the propagation path 170, 175, or 180. … Then, at 450 for the next frame or block to transmit, the transmitter ***'pre-distorts'*** a second signal and generates multiple signal replica ***with appropriate settings*** of the transmitting time, transmitting pace and directions, receiving directions and complex weight of the signal. These ***settings are determined by the parameters of the paths fed-back*** from the received at 440.

Id. at 9:1-12 (emphases added). A POSITA would understand that, here, "feedbacks" refers to sending path parameter information, and that the pre-distortion is carried out using settings determined using the path parameter information that is sent. A POSITA would understand that what is being sent and used is the channel estimation information, not any *algorithm*, which is separately described as something that is *used* to perform channel estimation but not *sent* for use in pre-distortion. *See id.* at 8:4-9:14.

35. I understand that the Petitioners (Defendants and Intervenors in this case) in IPR2024-00136 concerning the '347 patent have also interpreted the claim language consistent with my understanding. As an initial matter, I note that Petitioners do not propose any construction for this term in the Petition. *See T-Mobile USA, Inc. v. Cobblestone Wireless, LLC*, IPR2024-00136, Paper 1 (Petition) at 14 (PTAB Dec. 4, 2023). Moreover, the Petition alleges that a prior art reference "discloses performing a channel estimate on a reference signal to obtain channel estimate information or path parameter information, which is then provided to the transmitter

(i.e., the base station) as feedback," and that as a result this art discloses or renders obvious this disputed claim limitation. *Id.* at 36. The Petition does not allege that the claim limitation requires sending an *algorithm* and consistently argues that if "channel estimation information is sent from the receiver to the transmitter after the receiver performs channel estimation," then this claim limitation is met. *Id.* at 37; *see also generally id.* at 36-38. The expert declaration from Mr. James Proctor that Petitioners cited in the Petition contains similar conclusions. *See T-Mobile USA, Inc. v. Cobblestone Wireless, LLC*, IPR2024-00136, Ex. 1005 ¶¶138-145 (PTAB Dec. 4, 2023). In sum, Defendants (and their expert Mr. Proctor) agreed with my proposed interpretation in this IPR proceeding, providing further evidence that my interpretation is correct.

V. Disputed Terms in U.S. Patent 9,094,888 ("the '888 patent")

A. "Adaption manager"

No.	Term	Defendant's Proposed Construction	Plaintiff's Proposed Construction
2	"Adaption Manager" Claim 20	Indefinite under § 112, ¶6.	No construction necessary; plain and ordinary meaning; not subject to means-plus-function treatment under 35 U.S.C. § 112(6). If counterfactually § 112(6) were to apply, not indefinite. Functions: receive a handoff request from the second wireless network, the handoff request based, at least in part, on a determination by the second wireless network that the wireless device is capable of being covered by the first wireless network; cause a beam from among the one or more adaptable beams to be adapted in order to enable the wireless device to be covered by the first wireless network; transmit a confirmation to the second wireless network to indicate acceptance of the handoff request, wherein the wireless device is handed off from the second wireless network to the first wireless network. Structure: adaption manager 122 (FIGs. 1A-1C, 3, 5-7, 4:4-6, 5:18-20, 6:18-7:23, 8:65-10:13, 12:23-13:28,13:62-15:45, and/or corresponding figures)

36. I understand that Defendants contend that "adaption manager" is a means-plus-function term under 35 U.S.C. § 112(6) and that the term is indefinite because the specification fails to disclose corresponding structure clearly linked to the claimed functions of the "adaption manager."

37. First, I am not a lawyer, but I understand that the failure to use the word "means" in a claim creates a rebuttal presumption that Section 112(6) does not apply. I understand that to rebut this presumption, Defendants must demonstrate that the claim language fails to recite sufficiently definite structure, or else, that the claim language recites function without reciting sufficient

structure for performing that function. I also understand that a term that might not convey structure if viewed in isolation can nevertheless derive structure from the context of the surrounding claim language.

38. Here, the claim does not use the word "means," so I understand that Defendants must demonstrate that the claim language fails to recite sufficiently definite structure, or else, that the claim language recites function without reciting sufficient structure for performing that function. In my opinion, "adaption manager" recites sufficiently definite structure for performing the claimed functions and is a term with sufficiently definite meaning as the name of a structure in the wireless communications system.

39. First, a POSITA would readily understand that "adaption manager" is not a means-plus-function term under 35 U.S.C. § 112(6), because the "adaption manager" is a definite structure in the wireless communications system of claim 20 of the '888 patent.

40. The term "adaption manager" uses simple language understandable to a POSITA as referring to a structure in the wireless communications system of claim 20. This is confirmed by the surrounding claim language in the context of the specification of the '888 patent. Claim 20 of the '888 Patent reads as follows:

> 20. A system for a wireless device handoff between a ***first wireless network*** and a second wireless network, the system comprising:
>
> an *antenna array configured to generate one or more adaptable beams* to modify a coverage area for the first wireless network; and
>
> an ***adaption manager*** ***having logic, the logic configured to***:
>
> receive a handoff request from the second wireless network, the handoff request based, at least in part, on a determination by the second wireless network that the wireless device is capable of being covered by the first wireless network,
>
> *cause a beam from among the one or more adaptable beams to be adapted* in order to enable the wireless device to be covered by the

> first wireless network, and
>
> transmit a confirmation to the second wireless network to indicate acceptance of the handoff request, wherein the wireless device is handed off from the second wireless network to the first wireless network.

'888 patent at claim 20 (emphases added). The claim language itself makes clear that the term "adaption manager" conveys structure. The claim language indicates that the "adaption manager ha[s] logic," and that "logic [is] configured to" have various functionality. A POSITA would thus understand that the adaption manager comprises digital hardware and digital logic circuitry. To a POSITA in this field, the term "logic" refers to digital circuitry in the wireless base station, such as the digital circuitry that operates based on AND, OR, XOR, and the like forms of classical digital logic operations. Such operations are implemented in digital circuits, such as digital signal processors. A POSITA would understand that such logic circuitry is available off-the-shelf for use in developing a wireless communications base station. Such logic circuitry would be configured to implement the logic of the adaption manager. A POSITA would recognize that the adaption manager comprising logic describes the structure of the adaption manager as one of digital circuitry.

41. This understanding would be confirmed, for example, with reference to Figure 3 and the accompanying text, which describes the adaption manager as comprising logic. *See id.* at 9:5-29 ("The example adaption manager 122 of FIG. 3 includes ***adapt logic 310***, ***control logic 320***, memory 330, input/output (I/O) interfaces 340 and optionally one or more applications 350.") (emphases added). Figure 3 of the '888 patent illustrates that "adapt logic is coupled to control logic 320, memory 330 and I/O interfaces 340," all of which are part of adaption manager 122:

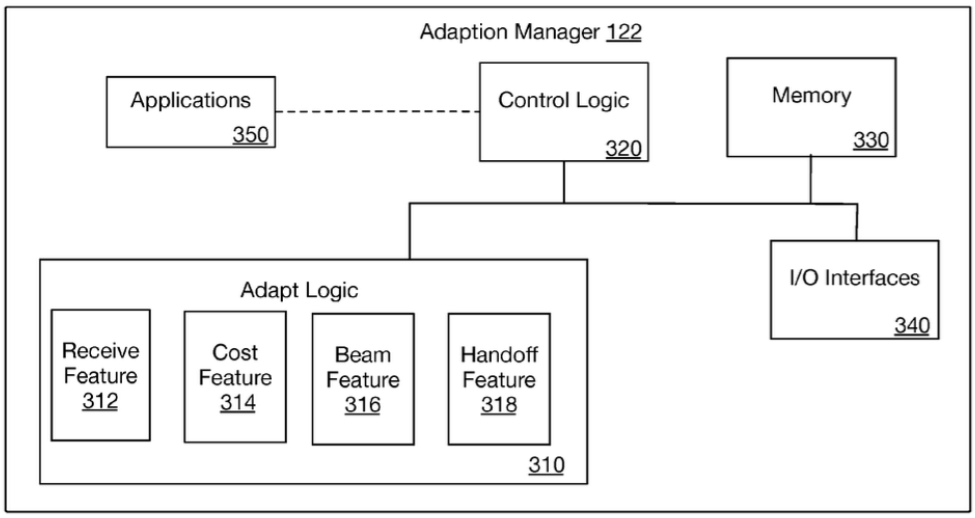


FIG. 3

Id. at Fig. 3. Moreover, the specification makes clear that "adapt logic 310 and control logic 320 may separately or collectively represent a wide variety of ***logic device(s)*** to implement the features of adaption manager 122. An example logic device may include one or more of ***a computer, a microprocessor, a microcontroller, a field programmable gate array (FPGA), an application specific integrated circuit (ASIC), a sequestered thread or a core of a multi-core/multi-threaded microprocessor or a combination thereof***." *Id.* at 9:20-28 (emphases added). A POSITA would thus understand that adaption manager 122 is comprised of one or more physical computing devices.

42. In addition, the adaption manager and its logic devices are at least in some embodiments part of the "first wireless network" of the claims (the "network" to which the wireless device is handed off to or the "target" network), which in the context of the specification, is likewise a physical structure. As the specification explains, in one of its examples, wireless networks 110 and 120 "may be wireless base-stations," such as those operating a 3GPP cellular wireless network. *Id.* at 4:30-56. Claim 20 makes clear that the "adaption manager" (and its logic) is part of this "first wireless network." This is again confirmed by the specification. *See id.* at

5:16-25 ("Similarly, adaption manager 122 may be co-located with a base-station associated with wireless network 120."); *see also id.* at Figs. 1A-1C, 4:4-6, 5:18-20.

43. Claim 20 also makes clear that the "adaption manager" is a physical structure that must be operatively coupled to other physical structures, such as the "antenna array." A POSITA understands that the '888 patent claims a wireless communications system (such as a wireless base station) that includes the structure of an adaption manager based on the surrounding language of claim 20. For example, claim 20 recites a "system for a wireless handoff between a first wireless network and a second wireless network, the system comprising (1) an antenna array configured to generate one or more adaptable beams to modify a coverage area for the first wireless network" and "(2) an adaption manager having logic…" *Id.* at claim 20. As claim 20 states, the "adaption manager" "cause[s] a beam … to be adapted in order to enable the wireless device to be covered by the first wireless network." Claim 20 also requires "an antenna array configured to generate one or more adaptable beams to modify a coverage area for the first wireless network." A POSITA understands that the "antenna array" is a well-known physical structure in wireless communications. A POSITA further understands that the "adaption manager having logic" is also a physical structure that is operatively coupled to the "antenna array," because claim 20 provides the "antenna array configured to generate one or more adaptable beams" and the "adaption manager having logic..." configured to "cause a beam from among the one or more adaptable beams to be adapted." Upon reading claim 20, a POSITA would understand that the "antenna array" and the "adaption manager" must be operatively coupled for the adaption manager to "cause a beam" generated by the antenna array "to be adapted." This language confirms that the "adaption manager having logic" is a physical structure because it is operatively coupled to the "antenna array," also a physical structure.

44. This understanding is confirmed by the specification. The '888 patent likewise makes clear that the "adaption manager 122" is a physical component of the "wireless base-station" that is coupled to the "antenna array 124." *Id.* at 4:1-12 ("Also, wireless network 120 includes an adaption manager 122 and an antenna array 124. … Also, for these examples, the antenna array 124 of wireless network 120 may be adaptable (e.g. via beamforming) to enable wireless network 120 to have variable coverage areas."). A POSITA would understand that the "adaption manager 122" is a physical structure coupled to the "antenna array 124" in the "wireless base-station" corresponding to "wireless network 120," enabling the beams generated by the antenna array to in fact be adaptable as claimed. *Id.* at 4:1-56, Fig. 1C.

45. In addition, claim 20 provides structure for the adaption manager's logic for an additional reason because it describes the inputs, outputs, and structural connections of the adaption manager. For example, claim 20 recites "an adaption manager having logic, the logic configured to: receive a handoff request from the second wireless network, the handoff request based, at least in part, on a determination by the second wireless network that the wireless device is capable of being covered by the first wireless network." This portion recites an input to the adaption manager—a handoff request. In addition, claim 20 further recites that the adaption manager's logic is also configured to "transmit a confirmation to the second wireless network to indicate acceptance of the handoff request, wherein the wireless device is handed off from the second wireless network to the first wireless network." This recites an output of the adaption manager—confirmation indicating acceptance of the handoff request.

46. Other portions of the specification confirm that the "adaption manager" of claim 20 is structural. As an example, the specification shows that adaption manager 122 in Figures 1A-C (shown as a component of the wireless base station coupled to the antenna array) can be

implemented in accordance with the block diagram in Figure 3, which shows that the "adaption manager 122" comprises "memory 330," "control logic 320," "adapt logic 310," and "I/O interfaces 340." *See id.* at Fig. 3. As explained above, a POSITA would understand "control logic" and "adapt logic" to be structural. Moreover, a POSITA would likewise understand that "memory" and "I/O interfaces" are physical components of computing devices. The specification therefore makes clear that the "adaption manager" is structural, as it is comprised of various structural components. *See, e.g.*, *id.* at 9:54-10:7 (describing memory 330 and I/O interfaces 340 as physical components). A POSITA would also understand that it is these I/O interfaces that the adaption manager uses to get its inputs and outputs, including those discussed above, further confirming that the adaption manager is a structural limitation.

47. In any event, even if the Court determines that "adaption manager" is a means-plus-function term under 35 U.S.C. § 112(6), the term is not indefinite. As an initial matter, I understand that Defendants did not propose a function for this term. In my analysis I assumed the functions are "receive a handoff request from the second wireless network, the handoff request based, at least in part, on a determination by the second wireless network that the wireless device is capable of being covered by the first wireless network; cause a beam from among the one or more adaptable beams to be adapted in order to enable the wireless device to be covered by the first wireless network; transmit a confirmation to the second wireless network to indicate acceptance of the handoff request, wherein the wireless device is handed off from the second wireless network to the first wireless network." To the extent Defendants propose a different function or functions at a later time, I reserve my right to supplement this declaration.

48. This term is not indefinite even if Section 112(6) applies because a POSITA would readily understand that there is corresponding structure in the specification clearly linked to the

functions of the "adaption manager," including, for example, with regard to the "adaption manager 122" structure in the specification described in e.g., Figures 3 and 5-7, 6:18-7:23, 8:65-10:13, 12:23-13:28, 13:62-15:45.

49. The specification clearly links each of the specified functions for "adaption manager" in claim 20 to adaption manager 122, for example in the context of Figures 3 and 5. With reference to Figure 3, the specification recites that "adaption manager 122 of wireless network 120 may include logic and/or features configured to ***receive the handoff request*** and ***determine whether to adapt antenna array 124 to facilitate coverage of wireless device 130A***. If a determination was made to adapt antenna array 124, adaption manager 122 may ***transmit a confirmation (e.g., via communication channel 160 or 170) to indicate acceptance of the handoff request***." *Id.* at 6:26-37 (emphases added). As another example, the specification recites that "[a]daption manager 122 may also include logic and/or features to ***adapt one or more beams of antenna array 124 to adjust wireless network 120's coverage area*** (e.g., back to coverage area 125-1) based at least on the handoff request. For example, the one or more beams of antenna array 124 may be configured to provide directional signal transmissions for wireless network 120 via the use of beamforming techniques to include, but not limited to, the use of conventional beamformers or adaptive beamformers." *Id.* at 6:51-59 (emphasis added); *see id.* 6:60-7:3 (clearly linking adaption manager 122 to adapt beams of antenna array 124 based on criteria such as predetermined network load); *id.* at 7:4-23 (clearly linking adaption manager 122 to "determine an effect of adapting one or more beams may have on wireless devices"); *see also id.* at 2:13-26. The specification contains similar disclosures in connection with Figure 5. *See, e.g., id.* at 12:37-47 (describing logic and receive feature 312 to allow adaption manager 122 to "receive a handoff request from wireless network 110"); *id.* at 12:64-13:8 (describing logic and beam feature 316 to allow adaption

manager 122 to "adapt one or more beams generated from or by antenna array 124 to facilitate coverage of wireless device 130A by wireless network 120 (e.g., via beam feature 316)"); *id.* at 13:9-18 (describing logic and beam feature 316 to allow adaption manager 122 to "transmit a confirmation to indicate acceptance of the handoff request from wireless network 110 for wireless device 130A (e.g., via beam feature 316)").

50. Figure 3 provides one example of adaption manager 122 which includes control logic 320 and adapt logic 310. The specification explains that "[a]dapt logic 310 may further include one or more of a receive feature 312, a cost feature 314, a beam feature 316 or a handoff feature 318, or any reasonable combination thereof" and "adapt logic 310 and control logic 320 may separately or collectively represent a wide variety of logic device(s) to implement the features of adaption manager 122." *Id.* at 9:12-15, 9:20-23; *see also generally id.* at 9:5-29 ("The example adaption manager 122 of FIG. 3 includes adapt logic 310, control logic 320, memory 330, input/output (I/O) interfaces 340 and optionally one or more applications 350. As illustrated in FIG. 3, adapt logic 310 is coupled to control logic 320, memory 330 and I/O interfaces 340. Also illustrated in FIG. 3, the optional applications 350 are arranged in cooperation with control logic 320. Adapt logic 310 may further include one or more of a receive feature 312, a cost feature 314, a beam feature 316 or a handoff feature 318, or any reasonable combination thereof. In some examples, the elements portrayed in FIG.3's block diagram are configured to Support or enable adaption manager 122 as described in this disclosure. A given adaption manager 122 may include some, all or more elements than those depicted in FIG. 3. For example, adapt logic 310 and control logic 320 may separately or collectively represent a wide variety of logic device(s) to implement the features of adaption manager 122. An example logic device may include one or more of a computer, a microprocessor, a microcontroller, a field programmable gate array (FPGA), an

application specific integrated circuit (ASIC), a sequestered thread or a core of a multi-core/multi-threaded microprocessor or a combination thereof.").

51. The adaption manager 122 of claim 20 minimally only requires the structure of portions of adapt logic 310 (receive feature 312 and beam feature 316), control logic 320, memory 330, and I/O interface 340 to perform the claimed functions. *See id.* at 12:37-47 (describing logic and ***receive feature 312*** to allow adaption manager 122 to "***receive a handoff request*** from wireless network 110") (emphases added); *id.* at 12:64-13:8 (describing logic and ***beam feature 316*** to allow adaption manager 122 to "***adapt one or more beams*** generated from or by antenna array 124 to facilitate coverage of wireless device 130A by wireless network 120 (e.g., via ***beam feature 316***)") (emphases added); *id.* at 13:9-18 (describing logic and beam feature 316 to allow adaption manager 122 to ***transmit a confirmation*** to indicate acceptance of the handoff request from wireless network 110 for wireless device 130A (e.g., via ***beam feature 316***).") (emphases added).

B. "Predetermined network load"

No.	Term	Defendant's Proposed Construction	Plaintiff's Proposed Construction
3	"Predetermined network load" Claim 12	Indefinite	No construction necessary; plain and ordinary meaning; not indefinite under 35 U.S.C. § 112.

52. I understand Defendants contend that "predetermined network load" is indefinite under 35 U.S.C. § 112. I disagree. A POSITA would understand, with reasonable certainty, the scope and meaning of the term or phrase "predetermined network load" as it is used in the '888 patent. The phrase "predetermined network load" uses simple language understandable to a layperson and to a POSITA. The intrinsic record, including the claims and the specification, uses the phrase "predetermined network load" consistent with its plain and ordinary meaning.

53. Claim 12 recites: "A method according to claim 9, wherein the adapting one or more beams comprises adapting one or more beams based, at least in part, on one of ***a predetermined network load*** placed on the first wireless network due to the handoff of the wireless device or an effect of adapting one or more beams on other wireless devices currently communicatively coupled to the first wireless network."

54. A POSITA would understand from claim 12 the scope and meaning of the phrase "predetermined network load," and specifically that this phrase specifies a factor affecting how one or more beams of an antenna array are adapted to facilitate coverage of the wireless device by the first wireless network. A POSITA would understand that that factor, "predetermined network load," refers to a predetermined network impact from adding another wireless device (as a result of any handoff) to the set of devices served by the wireless network. A POSITA understands that each wireless device served by the wireless network impacts the network, because each such wireless device requires at least some network resources assigned by the network for use by that device. The "network load" from the wireless device refers to its load upon the network, meaning the impact or burden on the network from the wireless device in terms of how much network resources the device requires. And the phrase "predetermined network load" refers to a determination in advance of what the network load from a wireless device being added to the network will be.

55. The specification of the '888 patent provides numerous descriptions of the phrase "predetermined network load" consistent with this understanding. According to the '888 patent, "[i]n some examples, adaption manager 122 may adapt the one or more beams of antenna array 124 based on certain criteria. For example, adaption manager 122 may include logic and/or features configured to ***predetermine criteria such as what network load*** would be placed on

wireless network 120 if wireless device 130A was handed off from wireless network 110." *Id.* at 6:60-66 (emphasis added). The specification then gives examples of what this predetermined criteria may be based upon, such as "an estimate of an average load for wireless devices in general (e.g., based on historical network data)" or "information included in the handoff request received from wireless network 110." *Id.* at 6:66-7:3; *see also id.* at 9:45-53 ("Memory 330 may also be arranged to temporarily maintain information associated with determining whether to accept a handoff request (e.g., predetermined network loads.").

56. As another example, the predetermined network load is described as the cost of handing off wireless device 130 to the wireless network, where a decision concerning whether to adapt the coverage area can be made based on the associated costs:

> Continuing from block 510 to decision block 520 (Adapt Coverage Area?), adaption manager 122 may include logic and/or features configured to determine whether to adapt the coverage area for wireless network 120 (e.g., via cost feature 314). In some examples, adaption manager 122 may evaluate the costs associated with a handoff of wireless device 130A to wireless network 120 and base a determination on the associated costs. ***Those costs may be based on criteria to include a predetermined network load placed on wireless network 120 if wireless device 130A is handed off.*** The costs may also be based on an effect of adapting the coverage area on other wireless devices coupled to wireless network 120 (e.g., wireless device 140A-I). If a determination is made by adaption manager 122 to adapt the coverage area, processing continues from decision block 520 to block 530. Otherwise, processing comes to an end.

Id. at 12:48-64 (emphasis added). Consistent with the plain meaning I described above, a POSITA would understand that the "predetermined network load" in this passage represents a "cost" in terms of the increased burden on the network from accommodating wireless device 130A, because each wireless device being served by the network requires network resources. *See id.* A POSITA would further understand that claim 12 uses very similar language to this passage. *Compare id.* at 12:55-57 ("predetermined network load placed on the wireless network 120 if wireless device 130A is handed off") *with id.* at claim 12 ("predetermined network load placed on the first

wireless network due to the handoff of the wireless device."). This similarity further confirms that the "predetermined network load" in claim 12 has the same plain and ordinary meaning that it has in the passage at 12:48-64, where it is described as the cost or network impact from adding another wireless device to the set of devices served by the wireless network.

57. From these descriptions, a POSITA would understand that, in the '888 patent, "predetermined network load" is used in accordance with the plain meaning I described above, and thus understand the scope of this term with reasonable certainty.

VI. Disputed Terms in U.S. Patent 10,368,361 ("the '361 patent")

A. Quality status module

No.	Term	Defendants' Proposed Construction	Plaintiff's Proposed Construction
4	"quality status module configured to determine a respective status of a first frequency spectrum resource and a second frequency spectrum resource" Claim 10	Means-plus-function term governed by § 112(f) **Function:** determine a respective quality status of a first frequency spectrum resource and a second frequency spectrum resource, wherein each of the first frequency spectrum resource and the second frequency spectrum resource are associated with an air interface that is available for use by the wireless base station for an uplink channel or a downlink channel **Structure:** Processor with software running an algorithm to execute measurement of "channel quality indicator (CQI), received interference power (RIP), and/or any other suitable quality metric or key performance indicator, such as RSSI, acknowledgment/negative acknowledgement (ACK/NACK) frequency, dropping rate, block error rate, bit error rate, signal-to-interference-plus-noise ratio (SINR), etc." 4:29-34	No construction necessary; plain and ordinary meaning; not subject to means-plus-function treatment under 35 U.S.C. § 112(f). If counterfactually § 112(f) were to apply: **Function:** determine a respective quality status of a first frequency spectrum resource and a second frequency spectrum resource, wherein each of the first frequency spectrum resource and the second frequency spectrum resource are associated with an air interface that is available for use by the wireless base station for an uplink channel or a downlink channel **Structure:** Processor with software running an algorithm to execute measurement of "channel quality indicator (CQI), received interference power (RIP), and/or any other suitable quality metric or key performance indicator, such as RSSI, acknowledgment/negative acknowledgement (ACK/NACK) frequency, dropping rate, block error rate, bit error rate, signal-to-interference-plus-noise ratio (SINR), etc."

58. First, I am not a lawyer, but as I explain above in the context of a different claim term, I understand that the failure to use the word "means" in a claim creates a rebuttal presumption that Section 112(6) does not apply. I understand that to rebut this presumption, Defendants must demonstrate that the claim language fails to recite sufficiently definite structure, or else, that the claim language recites function without reciting sufficient structure for performing that function.

59. Here, the claim does not use the word "means," so I understand that Defendants must demonstrate that the claim language fails to recite sufficiently definite structure, or else, that the claim language recites function without reciting sufficient structure for performing that function. I also understand that a term that might not convey structure if viewed in isolation can nevertheless derive structure from the context of the surrounding claim language.

60. In my opinion, a POSITA would readily understand that a "quality status module" recites sufficiently definite structure for performing the claimed functions and is a term with sufficiently definite meaning as the name of a structure in the wireless communications system of claim 10 of the '361 patent. Claim 10 of the '361 patent reads, in relevant part, as follows:

> 10. A wireless base station for a wireless communication network, the wireless base station comprising:
>
> > a ***quality status module*** configured to *determine a respective quality status of a first frequency spectrum resource* and a second frequency spectrum resource, wherein each of the first frequency spectrum resource and the second frequency spectrum resource are associated with an air interface that is available for use by the wireless base station for an uplink channel or a downlink channel;
> >
> > a ***processor coupled to the quality status module*** and configured to:
> >
> > > *determine, based on the quality status of the first frequency spectrum resource*, that the first frequency spectrum resource is a sub-optimal resource, for the uplink channel and the downlink channel, relative to other frequency spectrum resources that are available for use by the wireless base station;
> > > …

a scheduler module coupled to the processor ….

'361 patent at claim 10 (emphases added). To begin with, the surrounding claim language itself indicates to a POSITA that "quality status module" is structural. For example, a POSITA would recognize that the "quality status module" is coupled to a processor that uses outputs from the "quality status module" to make certain determinations. Thus, a POSITA recognize that the quality status module must be operatively coupled to the processor so that it could output its quality status determinations to the processor. Notably, I understand that no party contends that the "processor coupled to the quality status module" is a non-structural term. Similarly, I further understand that no party contends that the "scheduler module coupled to the processor" is a non-structural term. A POSITA would understand that each recites a structural component. Just as "scheduler module" and "processor" are undisputedly structural terms, "quality status module" is also a structural term, coupled to the same processor as the scheduler module.

61. The patent specification further confirms that "quality status module" is structural. For example, Figure 1 depicts node 110, which a POSITA would understand could be a wireless base station such as that mentioned in the preamble of claim 10. *Id.* at 3:56-65. "[N]ode 110 may obtain the quality status of the current uplink and downlink frequency spectrum resources available (e.g., subcarriers 201-206) using quality status module 113." *Id.* at 8:50-53. A person of ordinary skill in the art would understand that the quality status module 113 makes its determination of quality status (such as a channel quality indicator (CQI) and reference interference power (RIP)) using inputs from the processor to which it is operatively coupled, such as "reference signal received power (RSRP)," "received signal strength indicator (RSSI)," and "particle size of a wavelet or smaller particle size, such as a physical resource block (PRB)." *Id.* at 8:53-64. That quality status module receives such inputs is a further indication that it is structural.

62. In any event, even if the Court determines that "quality status module" is a means-plus-function term under 35 U.S.C. § 112(6), I agree with the function proposed by Defendants: "determine a respective quality status of a first frequency spectrum resource and a second frequency spectrum resource, wherein each of the first frequency spectrum resource and the second frequency spectrum resource are associated with an air interface that is available for use by the wireless base station for an uplink channel or a downlink channel."

63. A POSITA would readily understand that there is corresponding structure in the specification linked with the function. for example, at 4:18-34, 8:50-9:2, 10:55-11:3, and corresponding figures, e.g., Fig. 1, 4. From these descriptions, a POSITA would readily understand that "quality status module" is a definite structure in the wireless communications system of the '361 patent which, e.g., measures the CQI, RIP, RSSI, RSRP, or other quality status of a frequency spectrum resource. Wireless communications systems commonly include a structure for measuring quality status metrics such as CQI, RIP, RSSI, RSRP, or the like. This structure operates on the signals received through the antenna or antenna array of the communications system and performs measurements of the signals to compute CQI, RIP, RSSI, RSRP, or the like.

64. To the extent that the Court determines that this term is a means-plus-function term, I agree that a POSITA would understand that the claimed function of the quality status module is clearly linked to the Defendants' (and Plaintiff's) proposed structure: "Processor with software running an algorithm to execute measurement of "channel quality indicator (CQI), received interference power (RIP), and/or any other suitable quality metric or key performance indicator, such as RSSI, acknowledgment/negative acknowledgement (ACK/NACK) frequency, dropping rate, block error rate, bit error rate, signal-to-interference-plus-noise ratio (SINR), etc." *Id.* at

4:29-34. This structure is further described at 8:50-9:2 and 10:55-11:3.

B. Shared resource pool

No.	Term	Defendants' Proposed Construction	Plaintiff's Proposed Construction
5	"shared resource pool" Claims 10, 11, 17	A pool containing one or more sub-optimal frequency spectrum resources that can be scheduled for uplink and downlink channels	No construction necessary; plain and ordinary meaning

65. I understand that Defendants propose that "shared resource pool" be construed as "a pool containing sub-optimal frequency spectrum resources that can be scheduled for uplink and downlink channels."

66. In my opinion, no construction is needed for this term because it already has a plain and ordinary meaning that is readily understandable to a POSITA, and there are no examples in the intrinsic record where the term is used contrary to this plain meaning. Moreover, I disagree with Defendants' proposal construction for "shared resource pool," at least to the extent that the construction purports to require that the construction purports to require that the pool contain a first frequency spectrum resource that must be capable of being scheduled for both uplink and downlink channels. The plain language of claims 10 and 17 confirms that the claims only requires assigning a first frequency spectrum resource to the shared pool that be scheduled for either an uplink or a downlink channel. There is no support for adding this additional limitation; put simply, none of claims 10, 11, or 17 (or any other claim) contain any such "capability" requirement.

67. Further, the surrounding claim language does not provide support for a adding a requirement to the claim that the shared resource pool contain frequency spectrum resources capable of being scheduled for both uplink and downlink channels. For example, both claims 10 and 17 already recites that the "first frequency spectrum resource" need only be available for an

uplink channel or a downlink channel. *See id.* at claims 10 and 17 ("first frequency spectrum resource that is available for use by the wireless base station for an uplink channel or a downlink channel").

68. Further, the plain language of the claims confirms that the claims only require scheduling the first frequency spectrum resource "based on the updated directional allocation of frequency spectrum resources for the wireless base station." *See, e.g., id.* at claims 10 and 17 ("[scheduling]/[schedule] the first frequency spectrum resource based on the updated directional allocation of frequency spectrum resources for the [wireless] base station."). The claims do not require, either expressly or otherwise, that the "first frequency spectrum resource" is capable of being scheduled for ***both*** the uplink channel and the downlink channel; indeed, certain claims expressly state that the "first frequency spectrum resource" need only be scheduled "for ***either*** the uplink channel ***or*** the downlink channel" after it is assigned to the shared resource pool, thus confirming that certain claims can be met even if resources in the shared resource pool are only ever assigned to either uplink or downlink. *See id.* at claims 1 and 17 (emphases added). Accordingly, "shared resource pool" cannot be properly interpreted to require that the resources can be scheduled for ***both*** uplink ***and*** downlink, contrary to the express teachings of the '361 patent.

C. Sub-optimal resource

No.	Term	Defendants' Proposed Construction	Plaintiff's Proposed Construction
6	"sub-optimal resource" Claims 10, 17	Indefinite	No construction necessary; plain and ordinary meaning; not indefinite under 35 U.S.C. § 112.

69. I understand Defendants contend that "sub-optimal resource" is indefinite under 35 U.S.C. § 112. I disagree. A POSITA would understand, with reasonable certainty, the scope and

meaning of the term or phrase "sub-optimal" as it is used in claims 10 and 17 of the '361 patent. The phrase "sub-optimal resource" uses simple language understandable to a layperson and to a POSITA. The intrinsic record, including the claims and the specification, uses the phrase "sub-optimal resource" consistent with its plain and ordinary meaning.

70. In the context of these claims of the '361 patent, a POSITA would understand that the determination of whether the first frequency spectrum resource is the "sub-optimal resource" requires determining the quality status of the first frequency spectrum resource, and based on that quality status, determining that the first frequency spectrum resource is "sub-optimal" when compared with one or more other frequency spectrum resources available for use by the base station. For example, claims 10 and 17 both recite: "determine, based on the quality status [of the first frequency spectrum resource], that the first frequency spectrum resource is a sub-optimal resource … relative to other frequency spectrum resources that are available for use by the wireless base station."

71. The specification further supports this understanding. The specification uses the term "sub-optimal" to describe a frequency resource that is assigned to the shared resource pool because it is "less suitable" with a worse quality status one or more other resources available to the base station. For example, the specification describes "[i]n some embodiments, processor module 112 may assign the first frequency spectrum resource to shared resource pool 118 when it is determined that the first frequency spectrum resource is ***less suitable*** for an uplink channel ***than one or more other frequency spectrum resources available to node 110*** and also is ***less suitable*** for a downlink channel ***than one or more frequency spectrum resource that are available to node 110***." *Id.* at 11:4-17 (emphases added). A POSITA would understand that what makes a frequency spectrum resource "sub-optimal" is not a subjective inquiry and it is not a term

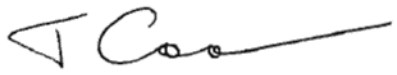
of degree, because instead it is an objective inquiry based on evaluating the quality status of the first frequency spectrum resource in relation to other resources available to the base station.

72. As an example, in relation to downlink channels, the specification describes comparing the CQI from a first frequency spectrum resource to the CQI from other frequency spectrum resources that are also available to the base station, and if the first frequency spectrum resource has the lower CQI then it is deemed the "sub-optimal resource" for a downlink channel. *Id.* at 11:18-22; *see also id.* at 8:56-60 ("To acquire suitability of some or all subcarriers 201-206 for downlink channels, node 110 may measure CQI, for example through the measurement of reference signal received power (RSRP) and received signal strength indicator (RSSI)."). A POSITA would thus understand that "sub-optimal" in relation to a downlink channel is an objective determination based on the measured quality status (e.g., CQI) of the frequency spectrum resource. A POSITA would further understand that, objectively, a lower CQI is sub-optimal compared to a higher CQI for purposes of the downlink.

73. As another example, in relation to uplink channels, the specification describes comparing the RIP from a first frequency spectrum resource to the RIP from other frequency spectrum resources that are also available to the base station, and if the first frequency spectrum resource has the higher RIP then it is deemed the "sub-optimal resource" for an uplink channel. *Id.* at 11:22-27; *see also id.* at 8:53-56 ("For example, quality status module 113 may acquire suitability of some or all of the subcarriers 201-206 for uplink channels by measurement of RIP for each of subcarriers 201-206."). A POSITA would thus understand that "sub-optimal" in relation to an uplink channel is an objective determination based on the measured quality status (e.g., RIP) of the frequency spectrum resource. A POSITA would further understand that, objectively, a higher RIP is sub-optimal compared to a lower RIP for purposes of the uplink.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this 12th Day of March 2024 at Fort Wayne, Indiana.



Todor Cooklev, Ph.D.

CERTIFICATE OF SERVICE

I certify that this document is being served upon counsel of record for Defendants on March 12, 2024 via electronic service.

/s/ Amy E. Hayden
Amy E. Hayden